

REMARKS

35 U.S.C. 112

Claim 10 is rejected under 35 U.S.C. 112, second paragraph as being indefinite. The examiner states:

Claimed subject matter in claim 10: "a divider for dividing by 3 and providing a divisor and a remainder", it needs to be further defined. It is not clear on which signal was divided by 3. Similar subject matter in claim 19 is a better example for clarifying this subject matter.

Claim 10 has been amended.

35 U.S.C. 103

Claims 1-9, 13-18 and 21-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. 6,597,349 ("Koyama") in view of U.S. 7,173,612 ("Nanno"). The examiner states:

As to claim 1, Koyama discloses an active matrix display, comprising:

an array of pixels provided over a common substrate (see Fig. 1 OA), each pixel comprising a display element and a switching device (Fig. 10(1002); and

a column driver (Fig. 10(1003)) for providing signals to the pixels for driving the display elements, the column driver comprising digital to analogue converter circuitry (see Fig. 2(208)) and providing a first number of display element drive levels greater than 2,

wherein each pixel comprises means for converting the first number of display element drive levels (Fig. 15(1507)) into a second, greater number, of pixel grey levels (see Col. 21 lines 23-35).

However, Koyama does not teach each pixel comprises means for receiving the first number of display element drive levels.

Nanno discloses a display device wherein teaches each pixel comprises means for receiving the first number of display element drive levels and converting into second, greater number of pixel grey levels (see Fig. 11, 13 and Col. 12 lines 8-49).

Applicant disagrees. Nanno does not disclose or suggest "each pixel comprises means for receiving the first number of display element drive levels and converting the first number of display element drive levels into a second, greater number, of pixel grey levels," as recited in

claim 1. The display element drive levels, as recited in claim 1, are analog levels provided by a digital to analogue converter circuitry. For example, a 3 bit digital data will yield 8 different analog display element driver levels. The pixel, as recited in claim 1, comprises means for receiving these display element driver levels and converting them into a second *greater* number of pixel gray levels. This is described in the specification by way of an example where two display elements or sub-pixels are used per pixel:¹

This specific implementation introduces 2 additional grey levels between every pair of grey levels provided by the DACs. In this case, grey levels n and $n+1$ are provided by the DACs and grey levels $n+1/3$ and $n+2/3$ are generated as a result of applying these grey levels to different sub-pixels. Hence, if the DACs provide m grey levels, the area weighted grey scale technique generates 2 new levels for every pair of grey levels provided by the DAC. There are $m-1$ pairs, so $2(m-1)$ new levels are generated to be added to the original m grey levels from the DAC, making $3m-2$ grey levels in total. In order to generate a 6 bit image, 64 grey levels are needed in total, implying that $m=22$.

As described in the example above, 22 original grey levels, or 5 bits of digital data, can be used to generate 64 different grey levels.

Nanno does not suggest, much less disclose, the foregoing feature of independent claim 1. In contrast, Nanno merely describes an area weighted method of displaying 2^n grey levels from n bit digital data². As such, the pixels of Nanno are themselves understood to be digital to analog converters since they receive n bit digital data and produce 2^n grey levels. The digital data received by Nanno's pixels have only two levels, logical low and logical high, and do not receive a first number of display element drive levels greater than 2. Claim 1 is patentable over Koyama and Nanno, either alone or taken in combination, at least for the reasons mentioned above.

¹ Applicant's Specification, Page 7, Lines 16-25.

² Nanno, Col. 12, Lines 34-38.

Claim 17 recites "providing first and second drive voltages to a display pixel having first and second display elements, the first and second drive voltages being selected from two adjacent drive voltage levels of a digital to analogue converter which has more than 2 output levels; and within the pixel, generating an intermediate grey level corresponding to a drive voltage between the first and second levels." Claim 17 is therefore patentable over Koyama and Nanno for at least the reasons mentioned with respect to claim 1.

Allowable Subject Matter

The Examiner states:

Claims 10-12 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Claims 19-20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: cited references do not teach or mention applicant's claimed limitation, "D/A converter which receives a 5-bit input derived from a 6-bit data signal by dividing the 6-bit data signal by 3 and providing a divisor and remainder" in claim 19.

Applicant acknowledges that the Examiner has indicated allowability of claims 10-12 and 19-20 if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant notes that other claims are also patentable for the reasons set forth above.

All of the dependent claims are patentable for at least the reasons for which the claims on which they depend are patentable.

Any circumstance in which the applicant has addressed certain comments of the examiner does not mean that the applicant concedes other comments of the examiner. Any circumstance in which the applicant has made arguments for the patentability of some claims does not mean that there are not other good reasons for patentability of those claims and other claims. Any

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circumstance in which the applicant has amended or canceled a claim does not mean that the applicant concedes any of the examiner's positions with respect to that claim or other claims.

No fees are due. Please apply any charges or credits to deposit account 06-1050.

Respectfully submitted,

Date: September 22, 2009 _____

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